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New Carabodid Mites (Acari: Oribatei) from the Bonin Islands

By

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：小笠原諸島産イブシダニ科の新種

This is the first report on soil-inhabiting mites of the Bonin Islands, where I stayed for about two weeks and collected at least dozens of oribatid mite species. The first impression of the oribatid fauna of these islands is the species abundance of the carabodid mites (family Carabodidae), which are known to become abundant in the southern parts of Japan, but not so strikingly as in the Bonin Islands. The present paper deals with several new species of the carabodid mites collected in Chichi-jima and Haha-jima Islands. All the holotype and a part of paratopotype specimens of these new species are deposited in the collection of the National Science Museum, Tokyo.

Before going further, I wish to express my hearty thanks to Mr. H. HARADA for his kind cooperation in collecting soil samples and extracting the mites. One of the new species was named after him (*Carabodes haradai*).

Carabodes lepidus sp. n.

[Chibi-ibushidani]

(Fig. 1)

MEASUREMENT. Body length: 328 (371) 418μ; width: 170 (202) 227μ.

PRODORSUM. Prodorsal surface wholly covered by cerotegument with dense and distinct foveolation. Rostral, lamellar and interlamellar setae lanceolate; *ro* and *la* strongly curved inward and downward in their basal part; *la* and *il* finely granulate on the surface; their relative length: $il > la > ro$; *il* about 1.5× as long as *la*; in lateral view, *la* evenly curved like an arch. Sensillus is a slender club, having almost equal thickness throughout its length or becoming slightly thicker toward the tip; the apical half densely barbed; the organ weakly bending backward.

NOTOGASTER. Wholly covered by cerotegument with large foveolae as on prodorsum. Humeral projection shows not so distinct angulation, but rather smoothly rounded. Fourteen pairs of notogastral setae narrowly leaf-shaped, the surface being finely granulate.

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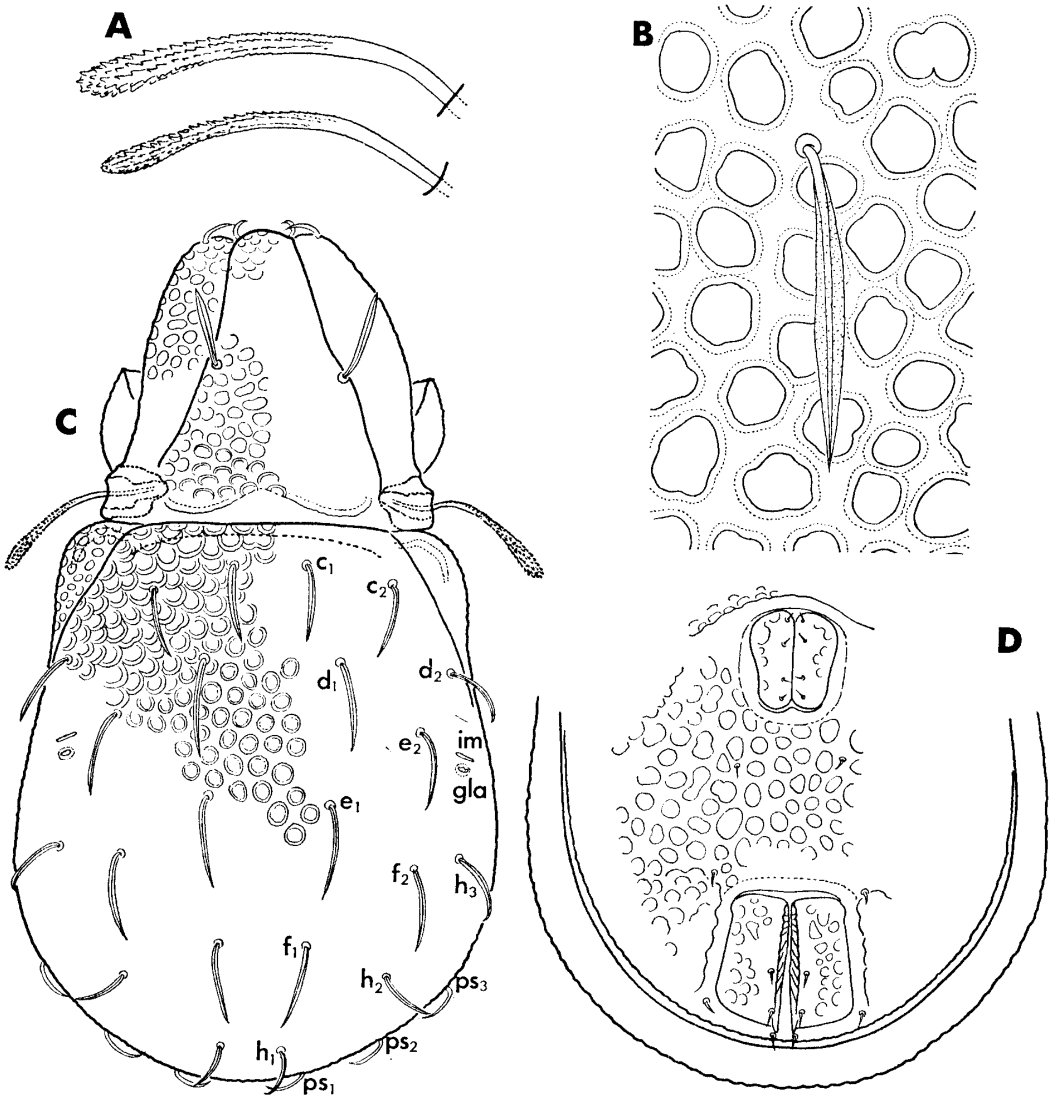

Fig. 1. *Carabodes lepidus* sp. n. A, sensilli; B, notogastral surface with a notogastral seta (e_1); C, dorsal view of body; D, ano-genital region.

In dorsal view, seta d_2 inserted far more marginally than e_2; mutual distance d_2—$d_2 \doteqdot h_3$—$h_3 > e_2$—e_2; d_2 located nearly in the same level of d_1. Lyrifissure *im* and gland opening *gla* located close together; they situated posterolateral to seta e_2, between setae d_2 and h_3, somewhat closer to the former.

ANO-GENITAL REGION. Genital and anal plates also with foveolate cerotegument. Genital plate with 4 short setae; distance g_2—g_3 longer than g_1—g_2 or g_3—g_4. A pair of aggenital setae inserted between genital and anal opening, its distance from anal opening being twice as long as that from genital opening. Anal plate provided with 2 short anal setae, of which the anterior one is inserted a little posteriorly to the middle point along the length of the plate. Adanal setae ad_2 and ad_3 inserted near the posterior and the anterior corner of anal opening, respectively; the posteriormost adanal setae ad_1 situated very close to each other behind the medioposterior projection of anal plates.

TYPE-SERIES. *Holotype* (NSMT-Ac 9065, in spirit): Kominato, Chichi-jima Island, 1–VII–1977, J. AOKI, from litter. ——*Paratopotypes* (23 exs.): the same data as holotype.—— *Paratypes* (3 exs.): S of Nakanotaira, Haha-jima Island, 23–VI–1977, J. AOKI & H. HARADA, from litter.

REMARKS. The most characteristic feature of the present new species is the shape of sensilli, which are long, slender, slightly thickened apically and weakly bending backward; they have no distinctly swollen head like those of *C. globosus* and those of *C. szentivanyi*; they are not strongly curled like those of *C. cellularis, C. albidus, C. lunaris, C. schwartzi*, etc., and not bending forward like those of *C. perezinigoi* and *C. imperfectus*. The sensilli of *C. pentatrichus* BALOGH, 1962, *C. costulatus* BALOGH, 1958, *C. pirinensis* KUNST, 1961, *C. travei* BALOGH et CSISZÁR, 1963 and *C. haradai* sp. n. somewhat resemble those of the present new species, but they are shorter and their barbation is longer than those of *C. lepidus*; moreover, the position of adanal setae of *C. lepidus* is quite peculiar: the setae ad_2 are situated close to the posterior corner of anal opening and the setae ad_1 are inserted so close together, that their mutual distance is equal to that of an_1.

Carabodes haradai sp. n.

[Harada-ibushidani]

(Fig. 2)

MEASUREMENT. Body length: 580(616)655 μ; width: 320(360)395 μ.

PRODORSUM. Median field of prodorsum covered by irregular wrinkles of cerotegument. Lamellae densely foveolate, being covered by fine, irregular network of cerotegument. Rostral, lamellar and interlamellar setae narrowly leaf-shaped, each with a median rib and very finely granulate on the surface; *ro* subequal in length to *la*; *il* about 1.6× as long as *ro*. Sensillus clavate, weakly curved toward opsterior and dorsal direction; the distal 4/5 of the exposed portion of sensillus provided with distinct barbs, which become stronger and denser toward the tip; the barbs inconspicuous on the opsterior side of sensillus.

NOTOGASTER. Evenly swollen, without marginal field. The whole surface covered by irregular network of cerotegument; the lines constructing the network constitute of minute network-like or zigzag structures; the cerotegument becomes loose and tend to be lifted from the body surface, when the mite is warmed in lactic acid; the surface under the cerotegument nearly smooth. Humeral projection low and trapezoid. Fourteen pairs of notogastral setae narrowly leaf-shaped, bending, each with a median rib and a pointed tip; the setae of median series (c_1, d_1, e_1 and f_1) hardly reaching setal pore of the succeeding seta, respectively; the setae of lateral series (d_2, e_2, f_2, h_2 and h_3) often, but not always, reaching setal pore of the succeeding seta; c_1 directed posteriad, while c_2 directed medio-posteriad. Lateroabdominal gland opening located at a level between d_2 and c_2, outside the line d_2—d_2.

ANO-GENITAL REGION. Genital opening slightly wider anteriorly than posteriorly. Genital plate with 4 pointed setae, about as long as their interspaces. Aggenital setae

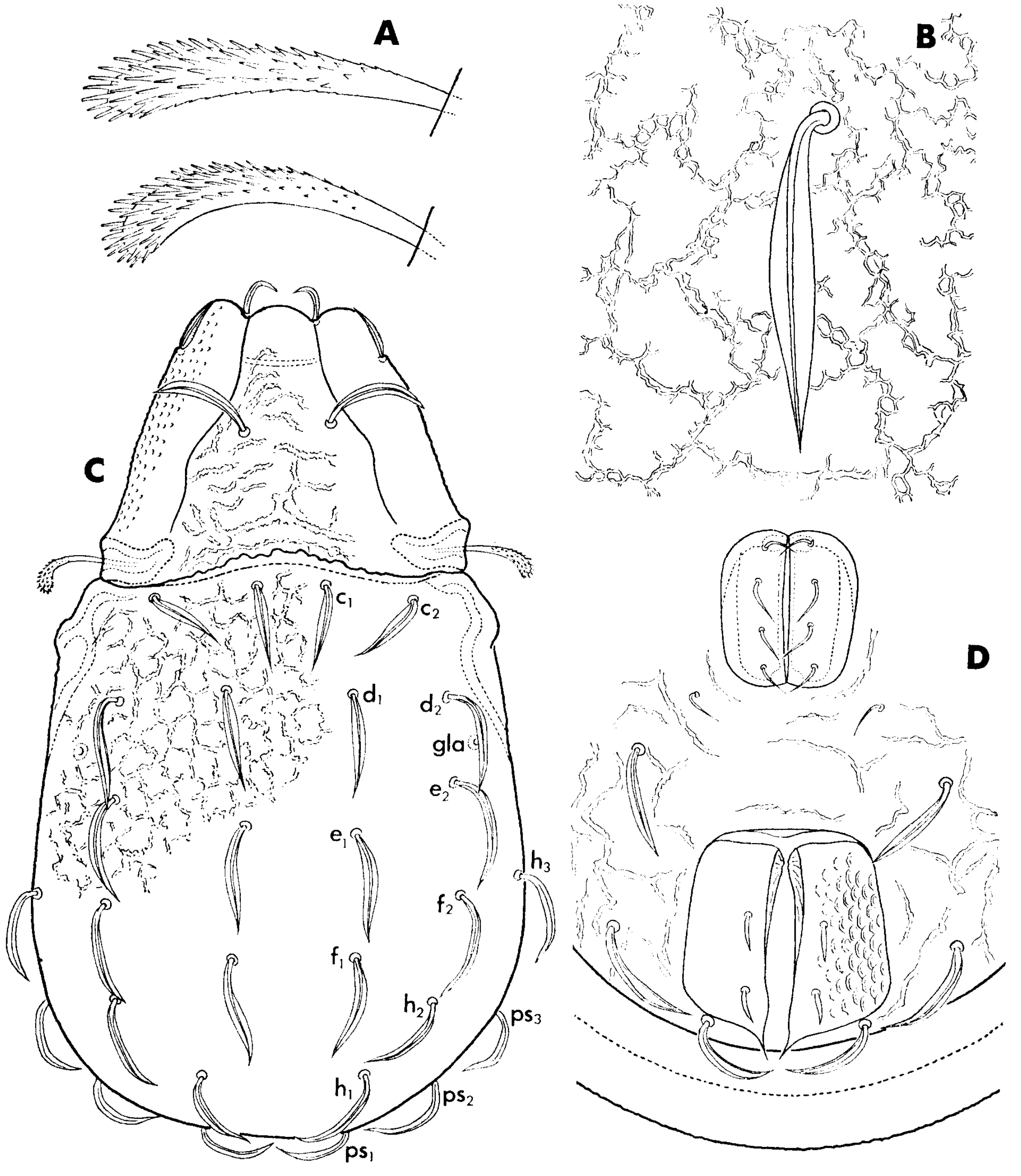

Fig. 2. *Carabodes haradai* sp. n. A, sensilli; B, notogastral surface with a notogastral seta (d_1); C, dorsal view of body; D, ano-genital region.

inserted at a level a little posterior to the posterior margin of genital aperture, their interspace being wider than genital opening and shorter than interspace of the anteriormost adanal setae. Anal opening a little wider posteriorly than anteriorly; anal plate provided with a prominent, sharply pointed posteromedian projection. In light-colored specimens the surface of the plates show a foveolate structure. Anal setae short and thick, rather blunt at tip. Three pairs of adanal setae similar in shape to notogastral setae; ad_3 inserted at a level between genital and anal openings, almost as distant from genital opening as from anal opening, or slightly closer to anal opening than to genital opening; the distance ad_1—

ad_2 shorter than ad_2-ad_3.

TYPE-SERIES. *Holotype* (NSMT-Ac 9067, in spirit): Kominato, Chichi-jima Island, 1–VII–1977, J. AOKI, from litter.——*Paratopotypes* (9 exs.): the same data as holotype.——

REMARKS. Having elongate, leaf-shaped notogastral setae, the present new species resembles *Carabodes pentatrichus* BALOGH, 1962, *C. travei* BALOGH et CSISZÁR, 1963, *C. szentivani* BALOGH et MAHUNKA, 1967, *C. schwartzi* BALOGH et MAHUNKA, 1969, and *C. davisi* BALOGH et MAHUNKA, 1969. They, except *C. pentatrichus*, differ from *C. haradai* in the shape of sensilli and the surface structure of notogaster. *C. pentatrichus* seems to be most similar to *C. haradai*, but it is distinguishable from the latter by the five pairs of long genital setae, the long aggenital setae, the slender adanal setae and the smaller body size ($484\times258\,\mu$).

Carabodes australis boninensis subsp. n.

[Ogasawara-ibushidani]

(Fig. 3)

MEASUREMENT. Body length: 616(638)672 μ; width: 340(364)390 μ.

PRODORSUM. Rostral seta long, almost as long as interlamellar seta, being weakly elbowed on the middle part. Lamellar seta a little shorter than *ro*, bending along the curvature of lamellar margin. Interlamellar seta slightly broadened toward the tip, nearly as long as the mutual distance of setae *il*. These three pairs of setae almost smooth. Sensillus short and clavate, weakly curved backward, finely and densely barbed. Prodorsal surface between lamellae covered by granules; the granules gradually becoming elongate and irregular in shape toward the posterolateral parts, where the granules are transformed into irregular worm-like ridges and minute, dense granules appear among the ridges.

NOTOGASTER. Humeral parts weakly projecting. The surface regularly covered by granules as seen on the anterior half of prodorsum; no irregular or ridge-like transformation of granules is observed on notogaster. Fourteen pairs of notogastral setae elongately leaf-like, each provided with a mid-rib, rather blunt at tip, without barbation and serration; only setae d_2 directde almost laterally, while the remaining setae directed posteriorly or posteromedially. Lateroabdominal gland opening located between setae d_2 and e_2.

ANO-GENITAL REGION. Genital aperture a little wider anteriorly than posteriorly, provided with 4 pairs of fine setae. A pair of aggenital setae subequal in length to genital setae. Anal plates irregularly wrinked. Two pairs of anal setae distinctly thicker and longer than genital setae, an_1 reaching the posterior margin of anal plate and an_2 reaching insertion pore of an_1. Three pairs of adanal setae leaf-like as notogastral setae; ad_3 inserted a little anterior to the level of the anterior margin of anal opening; distance $ad_1-ad_2>ad_2-ad_3$. Ventral plate covered by granules, which are gradually transformed into irregular wrinkles around genital and anal openings.

TYPE-SERIES. *Holotype* (NSMT-Ac 9069, in spirit): Kominato, Chichi-jima Island, 1–VII–1977, J. AOKI, from litter.——*Paratopotypes* (5 exs.): the same data as holotype.——*Paratype* (1 ex.): Oki-mura, Haha-jima, Is., 24–VI–1977, J. AOKI & H. HARADA, from

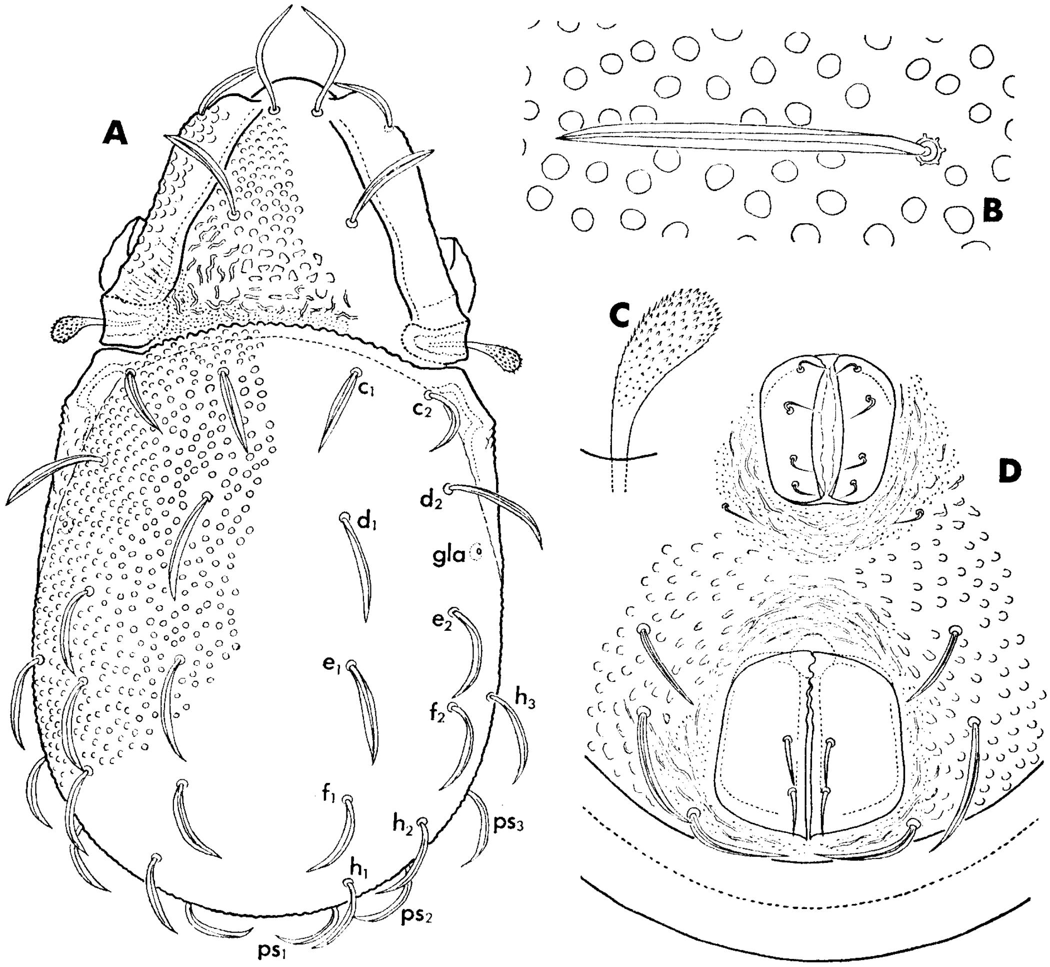

Fig. 3. *Carabodes australis boninensis* subsp. n. A, dorsal view of body; B, notogastral surface with a notogastral seta (d_1); C, sensillus; D, ano-genital region.

litter; *Paratype* (1 ex.): Minami-zaki, Haha-jima Is., 23–VI–1977, J. Aoki & H. Harada, from litter.

Remarks. The nominate subspecies, *Carabodes australis australis* Balogh et Csiszár, 1963, differs from the new subspecies, *C. australis boninensis*, in (1) the notogastral setae finely serrated preapically (according to the original figure, rostral and interlamellar setae appear to be also finely serrated) and (2) the long genital setae. In the description of the nominate subspecies no mention was made on the surface sculpture on the posterior part of prodorsum and the ventral plate.

Bathocepheus gen. n.

[Heko-ibushidani Zoku]

Notogaster broadly concave anteriorly and convex posteriorly. Suture between prodorsum and notogaster indistinct. Thirteen pairs of notogastral setae are present, seven pairs among them being situated in the middle field and the remaining six pairs arranged peripherally; these two groups of setae quite different in shape and size. A deep concavity exists between genital and anal apertures. Genito-anal chaetotaxy 4–0–2–3. Legs monodactyle.

TYPE-SPECIES. *Bathocepheus concavus* sp. n.

REMARKS. The present new genus resembles the genus *Opisthocepheus* AOKI, 1976 especially in the shape of notogaster as well as in the shape and arrangement of notogastral setae. But, the latter is distinguishable from the former by the fused lamellae and the sensilli directed forward.

Bathocepheus concavus sp. n.

[Heko-ibushidani]

(Fig. 4)

MEASUREMENT. Body length: 343(390)455 μ, width: 202(231)280 μ.

PRODORSUM. Lamellae separated, interspace between them being narrowest at the level nearly mid-distance between rostral setae and interlamellar setae. Lamellar setae inserted each on the outer margin of lamella, a short distance behind the tip; it bending inward and downward. Rostral setae strongly curved downward, their mutual distance being as wide as their length. Interlamellar setae broad and leaf-like. The posterior half of prodorsum partly covered by irregular granules, while the anterior half is foveolate. Sensillus directed upward and then inward; the distal half strongly barbed like a "toothbrush".

NOTOGASTER. Dorsosejugal suture indistinct. Convex middle field and flat marginal area clearly distinguished. Humeral region on each side weakly projecting. A large, round (somewhat ω-shaped) concavity exists on the anterior part of notogaster; a thick layer of cerogegument covering the middle part of the concavity. Thirteen pairs of notogastral setae consist of two types of setae distinctly different in size; two pairs on humeral region and four pairs on posterolateral margin are small; among seven pairs on middle field, six pairs are large and only anteromedian one pair of setae are small; these small setae inserted on the upper edge of notogastral concavity. Surface of notogaster covered by polygonal granules, which seem to be arranged irregularly or sometimes in polygonal network.

ANO-GENITAL REGION. Genital opening longer than wide and a itttle shorter than interspace between genital and anal openings; four pairs of genital setae very minute. Anal opening as long as wide; mutual distance of the anterior anal setae wider than that of the posterior ones. Three pairs of adanal setae leaf-like; ad_3 inserted at a level anterior to the anterior margin of anal opening. Aggenital setae could not be detected. A deep concavity exists between genital and anal sapertures; at the bottom of the concavity found an indistinct oval structure.

TYPE-SERIES. *Holotype* (NSMT-Ac 9071, in spirit): S of Nakanotaira, Haha-jima Island, 23–VI–1977, J. AOKI & H. HARADA, from litter.——*Paratopotypes* (4 exs.): The same data as holotype.——*Paratypes*: Mt. Sekimon, Haha-jima, 1 ex., 24–VI–1977, J.

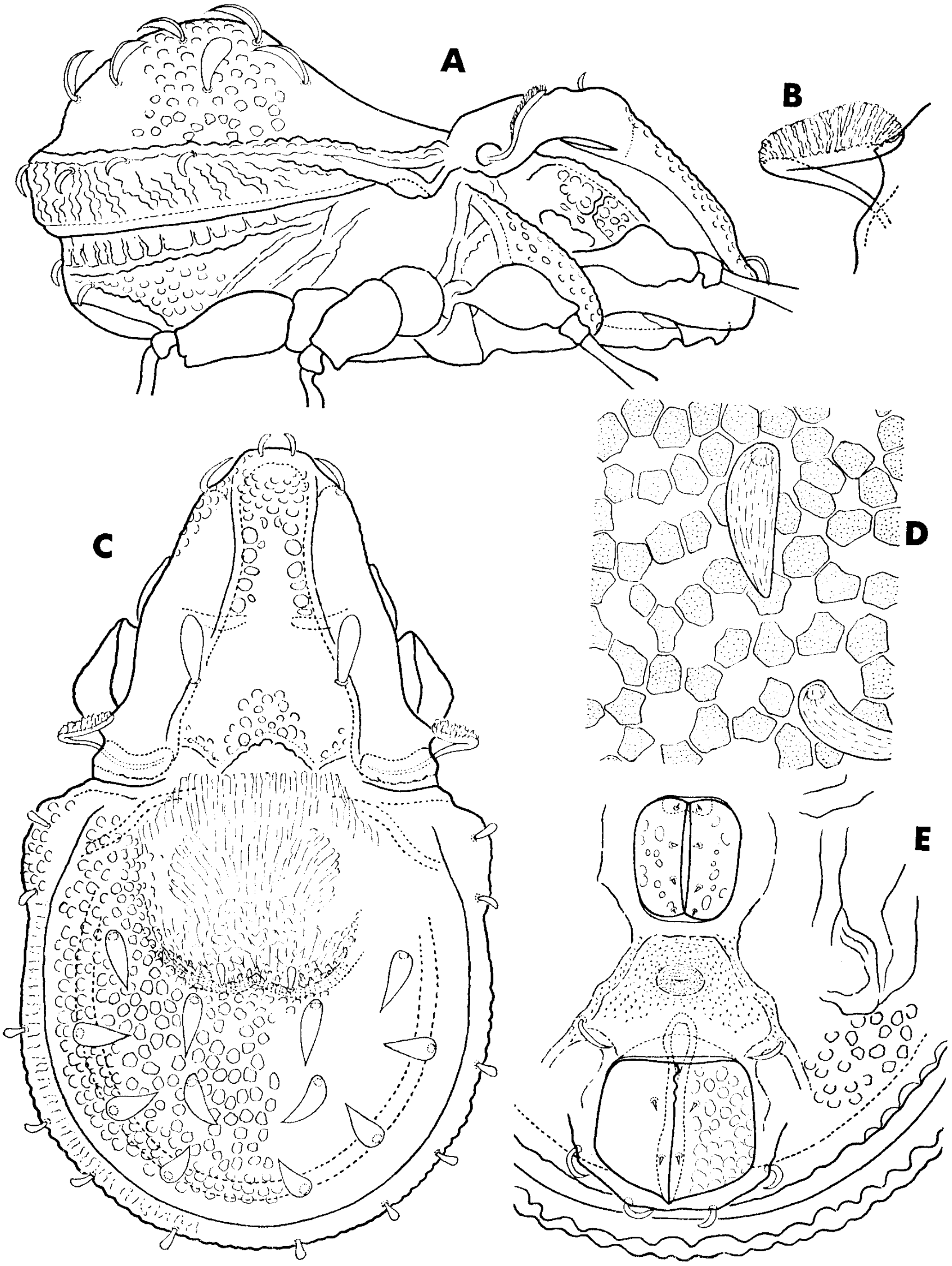

Fig. 4. *Bathocepheus concavus* gen. n. et sp. n. A, lateral view of body; B, sensillus; C, dorsal view of body; D, notogastral surface with notogastral setae; E, ano-genital region.

Aoki & H. Harada, from litter; Oki-mura, Haha-jima, Is., 24–VI–1977, J. Aoki & H. Harada, from litter; NE of Minami-zaki, Haha-jima Is., 3 exs., 23–VI–1977, J. Aoki & H. Harada, from litter; Mt. Yoake, Chichi-jima Island, 2 exs., 1–VII–1977, J. Aoki, from litter; Mt. Chuo, Chichi-jima Is., 1 ex., 2–VII–1977, J. Aoki, from litter; Mt. Mikazuki, Chichi-jima Is., 1 ex., 23–VI–1977, J. Aoki & H. Harada, from litter.

要　約

小笠原諸島の父島および母島の森林土壌表層部から抽出されたササラダニ類のうち，本報告ではイブシダニ科 Carabodidae を取り扱い，チビイブシダニ *Carabodes lepidus* sp. n.，ハラダイブシダニ *Carabodes haradai* sp. n.，オガサワライブシダニ *Carabodes australis boninensis* subsp. n.，ヘコイブシダニ *Bathocepheus concavus* gen. n. et sp. n. の1新属，4新種，1新亜種を記載した．なお，小笠原諸島からササラダニ類が記録されるのは今回がはじめてである．

Literature

Aoki, J., 1976. Oribatid mites from the IBP study area, Pasoh Forest Reserve, West Malaysia. *Nature and Life in S.E. Asia,* **7**: 39–59.

Balogh, J., 1958. Oribatides nouvelles de l'Afrique tropicale. *Rev. Zool. Bot. afr.,* **58**: 1–34.

Balogh, J., 1962. LXXV.-Acari Oribates (Res. Sci. Miss. Zool. I.R.S.A.C. Afr. Orient.). *Ann. Mus. Roy. Afr. Centr.,* (Zool.), (110): 90–131.

Balogh, J. & J. Csiszár, 1963. The zoological results of Gy. Topal's collectings in South Argentina. 5. Oribatei (Acarina). *Ann. Hist.-Nat. Mus. Natn. Hung.* (Zool.), **55**: 463–485.

Balogh, J. & S. Mahunka, 1967. New oribatids (Acari) from Vietnam. *Acta Zool. Acad. Sci. Hung.*, **13**: 39–74.

Balogh, J. & S. Mahunka, 1969. The zoological results of the Hungarian soil zoological expedition to South America. 11. Acari: Oribatids from the material of the second expedition, II. *Opusc. Zool. Budapest,* **9**: 31–69.

Kunst, M., 1961. Bulgarische Oribatiden IV. (Acari: Oribatei). *Acta Univ. Carolinae,* (Biol.), **1961**: 151–183.